

Wenzel Jakob

Curriculum Vitae

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EDUCATION

Cornell University <i>Ph.D., Computer Science, Minor: Mathematics</i> Advised by Steve Marschner. Thesis: "Light Transport on Path-Space Manifolds"	Ithaca, USA 2008–2013
Cornell University <i>M.Eng., Computer Science</i> Thesis: "An Analytic Framework for Anisotropic Diffusion in Computer Graphics"	Ithaca, USA 2007–2008
Karlsruhe Institute of Technology <i>Vordiplom, Double major in Computer Science and Mathematics</i> Thesis: "Accelerating the bidirectional path tracing algorithm using a dedicated intersection processor"	Karlsruhe, Germany 2004–2007

RESEARCH INTERESTS

- Robust bidirectional light transport algorithms
- Applications of differential geometry
- Scientific computing
- Material appearance modeling

PUBLICATIONS

Upcoming
Physically Based Rendering: From Theory To Implementation (third edition)
Matt Pharr, Greg Humphreys, Wenzel Jakob
Morgan Kaufmann Publishers

Path Space MCMC Methods in Computer Graphics
Wenzel Jakob
The Eleventh International Conference on Monte Carlo and Quasi-Monte Carlo Methods in Scientific Computing

2015
Geometric Tools for Exploring Manifolds of Light Transport Paths
Wenzel Jakob and Steve Marschner
In Communications of the ACM: Research Highlights (November 2015)

Instant Field-Aligned Meshes
Wenzel Jakob, Marco Tarini, Daniele Panozzo, Olga Sorkine-Hornung
In ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia 2015)

Anisotropic Gaussian Mutations for Metropolis Light Transport through Hessian-Hamiltonian Dynamics
Tzu-Mao Li, Jaakko Lehtinen, Ravi Ramamoorthi, Wenzel Jakob, Fredo Durand
In ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia 2015)

Path-space Motion Estimation and Decomposition for Robust Animation Filtering

Henning Zimmer, Fabrice Rousselle, Wenzel Jakob, Oliver Wang, David Adler, Wojciech Jarosz, Olga Sorkine-Hornung, Alexander Sorkine-Hornung

In *Computer Graphics Forum (Proceedings of Eurographics Symposium on Rendering 2015)*

2014

Building Volumetric Appearance Models of Fabric using Micro CT Imaging

Shuang Zhao, Wenzel Jakob, Steve Marschner and Kavita Bala

In *Communications of the ACM: Research Highlights (November 2014)*

A Comprehensive Framework for Rendering Layered Materials

Wenzel Jakob, Eugene D'Eon, Otto Jakob, Steve Marschner

In *ACM Transactions on Graphics (Proceedings of SIGGRAPH 2014)*

Discrete Stochastic Microfacet Models

Wenzel Jakob, Miloš Hašan, Ling-Qi Yan, Jason Lawrence, Ravi Ramamoorthi, Steve Marschner

In *ACM Transactions on Graphics (Proceedings of SIGGRAPH 2014)*

Rendering Glints on High-Resolution Normal-Mapped Specular Surfaces

Ling-Qi Yan, Miloš Hašan, Wenzel Jakob, Jason Lawrence, Steve Marschner, Ravi Ramamoorthi

In *ACM Transactions on Graphics (Proceedings of SIGGRAPH 2014)*

2013

Light Transport on Path-Space Manifolds

Wenzel Jakob

Ph. D. thesis, Aug. 2013, Computer Science Department, Cornell University

2012

Manifold Exploration: A Markov Chain Monte Carlo technique for rendering scenes with difficult specular transport

Wenzel Jakob and Steve Marschner

In *ACM Transactions on Graphics (Proceedings of SIGGRAPH 2012)*

Structure-aware Synthesis for Predictive Woven Fabric Appearance

Shuang Zhao, Wenzel Jakob, Steve Marschner, and Kavita Bala

In *ACM Transactions on Graphics (Proceedings of SIGGRAPH 2012)*

2011

Progressive Expectation–Maximization for Hierarchical Volumetric Photon Mapping

Wenzel Jakob, Christian Regg, and Wojciech Jarosz

In *Computer Graphics Forum (Proceedings of Eurographics Symposium on Rendering 2011)*

Building Volumetric Appearance Models of Fabric using Micro CT Imaging

Shuang Zhao, Wenzel Jakob, Steve Marschner and Kavita Bala

In *ACM Transactions on Graphics (Proceedings of SIGGRAPH 2011)*

Goal-Based Caustics

Marios Papas, Wojciech Jarosz, Wenzel Jakob, Szymon Rusinkiewicz, Wojciech Matusik, Tim Weyrich
In *Computer Graphics Forum (Proceedings of Eurographics 2011)*

2010

A radiative transfer framework for rendering materials with anisotropic structure

Wenzel Jakob, Adam Arbree, Jonathan T. Moon, Kavita Bala and Steve Marschner
In *ACM Transactions on Graphics (Proceedings of SIGGRAPH 2010)*

2009

Capturing Hair Assemblies Fiber by Fiber

Wenzel Jakob, Jonathan T. Moon, Steve Marschner
In *ACM Transactions on Graphics (Proceedings of SIGGRAPH Asia 2009)*

AWARDS AND FELLOWSHIPS

- 2013: ETH Postdoctoral Fellow (awarded 207,000 CHF over a period of 2 years; funded by the ETH Zürich Postdoctoral Fellowship program and Marie Curie Actions COFUND)
- 2012: Yahoo! Teaching award for the course 'Realistic Image Synthesis' (CS6630), Cornell University
- 2009: First prize for developing the best optimizing x86 compiler in the course CS4120 at Cornell University (joint work with Owen Arden, Danfeng Zhang and Catalin Dumitru)
- 2009: Outstanding teaching assistant award for the course 'Introduction to Scientific Computing' (CS3220), Cornell University
- 2007: Recognized for being in the top 10% of computer science Vordiplom graduates at the Karlsruhe Institute of Technology

OPEN SOURCE PROJECTS

Mitsuba Renderer

Physically based rendering software 2007–Present
Developed Mitsuba (<http://www.mitsuba-renderer.org>), an open source C++-based rendering framework that implements advanced rendering techniques and uses cloud computing to parallelize rendering tasks over thousands of networked cores. Mitsuba is extremely modular to permit easy prototyping of new parts of the rendering pipeline for research purposes. It consists of over 160K lines of code and been used in numerous research projects in academia and industry. As of 2014, Mitsuba has been used in over 50 research publications, including 30 papers in SIGGRAPH, SIGGRAPH Asia, and Transactions on Graphics. Users include Cornell, MIT, University of Virginia, Columbia University, UC Berkeley, NYU, INRIA, TU Berlin, TU Dresden, Microsoft Research, NVIDIA Research, Google X, Disney Research, Volvo Car Corporation, Square Enix, Weta Digital, and the US Navy.

Nori

Educational ray tracer 2012
Developed Nori (www.mitsuba-renderer.org/nori), an educational rendering toolkit used to teach the graduate-level computer graphics course at Cornell University.

PATENTS

Progressive Expectation–Maximization for Hierarchical Volumetric Photon Mapping

Wenzel Jakob, Christian Regg, and Wojciech Jarosz
Disney Enterprises, Inc., April 21, 2015, US Patent *US9,013,484*

Reflective and refractive surfaces configured to project desired caustic pattern

Marios Papas, Wojciech Jarosz, Wenzel Jakob, Szymon Rusinkiewicz, Wojciech Matusik, Tim Weyrich
Disney Enterprises, Inc., Mar 14, 2013, US Patent *US20130066596 A1*

A Decomposition for Improving Image-based Postprocessing of Path-traced Animation Sequences

Henning Zimmer, Fabrice Rousselle, Wenzel Jakob, Oliver Wang, Olga Sorkine-Hornung, Alexander Sorkine-Horning
Patent pending

EXPERIENCE

School of Computer and Communication Sciences, EPFL **Lausanne, Switzerland**
Tenure-track assistant professor 2016–Present

Leading the Realistic Graphics Lab

ETH Zürich **Zürich, Switzerland**
Postdoctoral researcher at the Interactive Geometry Lab, Institute of Visual Computing 2013–Present

Working at the intersection of rendering and geometry. Advised by Olga Sorkine-Horning

Cornell University **Ithaca, USA**
Graduate Research Assistant, Computer Science Department 2008–2013

Worked on robust bidirectional light transport algorithms, massively parallel rendering and material appearance modeling. PhD Advisor: Prof. Steve Marschner

Weta Digital **Wellington, New Zealand**
Research & Development Intern, Rendering research group 2012

Integrated Manifold Exploration in Weta's rendering system. Worked on simulations of light in layered substances, which led to the 2014 SIGGRAPH paper "A Comprehensive Framework for Rendering Layered Materials".

Disney Research Zürich **Zürich, Switzerland**
Research Intern, Rendering Group 2010–2011

Worked on compact representations for volumetric transport and the design of computational materials.
Advisor: Wojciech Jarosz

Karlsruhe Institute of Technology **Karlsruhe, Germany**
Undergraduate Research Assistant, Institute of Computer Science and Engineering 2006, 2007

Designed and implemented FPGA units for the sensory and motor control subsystems of the ARMAR-III humanoid robot. Advised by Prof. Tamim Asfour and Prof. Rüdiger Dillmann.

SAP CEC Corporate Research **Walldorf, Germany**
Research Intern 2006

Developed an interface for the integration of landmark data with SAP R/3 systems

1&1 Internet AG **Karlsruhe, Germany**
Software Developer 2001–2004

Designed a J2EE application stack for company-wide permission management.

TEACHING

- As lecturer
 - Image Synthesis (252-5705-00L), ETH Zürich, 2015, joint course with Wojciech Jarosz
- As teaching assistant
 - Advanced Methods in Computer Graphics (252-5704-00L), ETH Zürich, 2014
 - Realistic Image Synthesis (CS6630), Cornell University, 2012
 - Introduction to Compilers (CS4120), Cornell University, 2011
 - Introduction to Scientific Computing (CS3220), Cornell University, 2009
 - Interactive Computer Graphics (CS569), Cornell University, 2008
 - Linear Algebra and Analytic Geometry, Universität Karlsruhe, 2006–2007

PROFESSIONAL ACTIVITIES

- Editor for
 - Journal of Computer Graphics Techniques (JCGT)
- Program committees
 - SIGGRAPH 2016 Technical Papers
 - Inverse Rendering Workshop at ICCV 2015
 - Monte Carlo and Quasi-Monte Carlo Methods 2016
 - Eurographics Symposium on Rendering 2015 Papers
 - SIGGRAPH 2015 Technical Papers
 - Eurographics 2015 Technical Papers & STAR (State of the Art Reports)
 - Eurographics Symposium on Rendering 2014 Papers
 - Eurographics 2013 Short Papers
- Reviewer for
 - SIGGRAPH: 2011-2015
 - SIGGRAPH Asia: 2011-2015
 - Eurographics: 2010-2015
 - Eurographics Symposium on Rendering: 2009, 2011-2015
 - IEEE Computer Graphics and Applications: 2012
 - Transactions on Pattern Analysis and Machine Intelligence: 2013
 - The Visual Computer: 2013-2014
 - High Performance Graphics: 2010, 2015
 - Monte Carlo and Quasi-Monte Carlo Methods (MCQMC): 2014
- Memberships: ACM SIGGRAPH and Eurographics

NATIONALITY & LANGUAGES

Nationality: German (also mother tongue)

English: Fluent

Japanese: Intermediate

Intermediate conversations, can read/write ~1000 Kanji characters

French: Basic

Simple words and phrases only

OTHER INTERESTS

- Hiking & Winter sports
- Japanese language studies